

REMARKS

The allowability of claims 4 and 13-15 is acknowledged appreciatively.

However, the rejection of independent claim 1 under 35 USC 103 for obviousness from the cited Sinha, et al. publication and Zhao, et al. patent is traversed, because Sinha, et al. do not disclose an end-to-end estimation of the bandwidth available in a client-server connection. In fact in the abstract Sinha says: "WTCP is rate-based, uses only end-to-end mechanism, performs rate control at the receiver, and uses inter-packet delays as the primary metric for rate control". We remark the "uses inter-packet delays" is different from "available bandwidth estimation" as it is proposed in this application, because inter-packet delays do not provide a measurement of available bandwidth.

In Section 1, point 2 Sinha, et al. say: "the receiver adaptively computes the desired transmission rate based only on the characteristics of the path ." We remark that "characteristics of the path" is generic and different from "available bandwidth".

In Section 1, point 3 Sinha, et al. say: "WTCP uses the ratio of the inter-packet separation at the receiver and the inter-packet separation at the sender as the primary metric for rate control ." We remark that the mentioned ratio is different from the concept of available bandwidth as proposed in the patent application. Sinha, et al. repeat these concepts in sec. 3.1. The available bandwidth as described in this patent is the average of bandwidth samples, where a sample is computed as the ratio of delivered data over the time interval data are received. Therefore they are measured in units of data (i.e., bit) per unit of time (i.e., seconds) and NOT as a ratio of inter-packet delay as claimed.

In Sec. 4 Sinha, et al. say: "The send monitors the reception of Acks, and adjusts its rate accordingly. It also monitors the Acks to tune the ACK frequency. . . ." We remark the previous description is generic and does not disclose how monitoring of the acks translate to control the action as now recited in claim 1.

Adding the Zhao, et al. patent does not help, because it does not apply the low-pass filter to measure the available bandwidth as measured by a client-server connection. Zhao uses the low-pass filter in order to filter " $r(t)$, which is the aggregate high priority CBr/VBR traffic arrival rate in link L at time t" (see column 7 lines 54-55, column 9 lines 44-45). We remark that the present invention estimates the available bandwidth as viewed by a client-server connection at the end points and not the bandwidth used by other connections at a switch/router link as in the Zaho, et al. patent.

Further, as to claim 2 and its rejection under 35 USC 103 for obviousness from the Zhao, et al. patent and Sinha, et al. and Lai, et al. publication, we have already said that the Sinha, et al. method is based on inter packet delay whereas claim 2 is based on delivered-data and time-to-deliver bases. We have already said that Zhao, et al. method measures the bandwidth used at the switch/router by other traffic whereas this patent measures the available bandwidth as viewed by the sender or the receiver and NOT the bandwidth used by other traffic at the switch/router. As far as regard the Lai et al. method, it measures the link capacity and not the available bandwidth.

The Packet Pair approach measures the link bottleneck capacity whereas we propose to measure the available bandwidth, i.e. the left over capacity as viewed by the sender or the receiver. The packet pair approach has many problems as shown in the cited Lai paper. In particular, regarding the Lai paper, [Sec. IV bandwidth measurements algorithms, -D

Receiver and Sender based packet Pair] they compute a sample as $b = \frac{s_2}{a_2 - a_1}$

On the other hand we claim to compute bandwidth samples as ratio of delivered-data over time-to-deliver as in claim 2 here amended.

As to claim 3, the coefficients in the Zhao, et al. filter are not time varying.

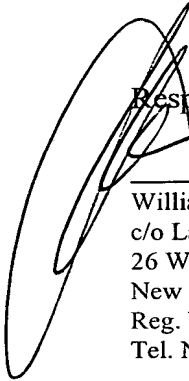
As to claim 5, Sinha, et al. do not propose a method for adapting the rate based on the available bandwidth as compared in this patent but a method based on inter-packet delays as noted above.

As to amended claim 7 above, Sinha, et al. do not disclose a method for adaptively setting congestion window and slow start threshold because they use a rate-based control and not a window based control. Congestion window and slow start threshold are used only in window based control and not in rate-based control. They never talk about setting windows (that are measured in packets). They always talk about rate (that are measured in packets per second).

As to the further rejection of claim 9 under 35 USC 103 from the Zhao, et al. patent and the Sinha, et al. and Albuquerque, et al. publications, what we claim as unique is the method to select the quality of video or the number of layers based on the end-to-end bandwidth estimation herein claimed.

Reconsideration and allowance are, therefore, requested.

Respectfully submitted,


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